REMARKS

The provisional election of Group I, claims 1-20, is hereby affirmed. The right is reserved to file divisional applications directed to the invention of Group II, claims 21-25, or to other disclosed matter from the present application. The non-elected claims have presently been cancelled without prejudice.

Claims 1-3, 6-14, 19, and 26-27 are pending for the Examiner's review and consideration. Of these claims, claims 1-3, and 19 are presently amended, and claims 26-27 have been added.

Claim 3 was also rejected under 35 U.S.C. § 112, second paragraph, for lack of antecedent basis. The recitation of a "first implantation location" is no longer present in this claim, which is thus believed to be definite.

Claims 1-13, and 15-20 were rejected under 35 U.S.C. § 103(a) as obvious over Maa et al. (6,780,796), in view of in view of Sakaguchi et al. (6,534,382). Claim 1 recites a method of preparing a crystalline wafer in which a first composite structure is provided with an epitaxial layer that is in a strained state on a support substrate. The epitaxial layer is relaxed to an at least partially relaxed state, and a region of weakness is created substantially between the epitaxial layer and the support substrate. A receiving substrate is associated with the composite structure, which is split at the region of weakness to provide a production wafer and a donor wafer.

Maa discloses relaxing a SiGe layer by implanting H_2^+ ions beyond and into a region well below the strained SiGe layer. The Maa teaching does not provide for transferring the SiGe layer to a receiving wafer, or conducting any splitting operation.

Sakaguchi is directed to a process to produce a semiconductor article by bonding a film onto a substrate that has a porous semiconductor layer, and separating the film at the porous layer by peeling. The porous layer is provided during the build-up of the wafer and before the provision of a subsequent nonporous layer thereabove, for example as seen in Figs. 2A-2B. Additionally, there is no teaching or suggestion to provide a strained layer anywhere in the wafer. In fact, it would not be clear to one of ordinary skill in the art whether a strained layer would be able to survive the peeling method disclosed in Sakaguchi to separate the film from the remainder of the wafer, and thus there would not be a reasonable expectation of success. Consequently, no motivation exists to look to the Sakaguchi teaching

based on Maa because Sakaguchi's final product does not require any layer detachment and it would not be clear that a strained layer could be detached as provided by Sakaguchi.

Claim 2 further defines that dislocations are provided in a dislocation layer between the first epitaxial layer and the support substrate to relax the epitaxial layer, and claim 3 defines that the region of weakness is created by implanting atomic species between the first epitaxial layer and the support substrate. These claims further define features that are not taught or suggested in any combination of Maa or Sakaguchi. With respect to Sakaguchi, even assuming that a strained layer were to be grown on top of the porous layer, there is no motivation to implant any atomic species in a location between these layers, since the porous layer is already provided to facilitate splitting, there is no reason for providing a further implantation once the upper layer is already in place. Also, Maa provides any dislocations well below the strained layer.

Finally, claim 26 further defines that the implantation of the atomic species both creates the region of weakness and provides dislocations for relaxing the strained state of the epitaxial layer. This claim is supported, for example, at page 11, in the paragraphs beginning at lines 13 and 18. This claim provides the surprising advantage over the references as it allows the use of a single step to obtain both the relaxation and the region of weakness for the subsequent splitting operation. A region of weakness is not taught to be provided to detach a layer at all in Maa, and there is certainly no implantation that takes place between the strained layer and the substrate on which it is associated or grown. The implantation takes place at a distance below the strained layer in Maa. Thus the invention of claim 26 is not taught or suggested by any combination of Maa and Sakaguchi.

Finally, it has been realized by the inventors that it is especially advantageous to implant atomic species directly between the strained layer and the supporting substrate, since this boundary has a localizing effect, which causes the atomic species being implanted to be focused narrowly in the crystalline transition between the strained epitaxial layer and the supporting substrate. Consequently, a much narrower region of weakness can be created than with traditional implantation methods, which results in a smaller region of damaged material that would usually be removed after the splitting. This results in more efficient use of the wafer material by reducing waste, and claim 26 thus provides another surprising advantage over the references.

Claim 27 specifies that the first epitaxial layer is grown in the strained state on the support substrate, which is supported, for example, at page 8 in the paragraph beginning on line 3.

It is believed that the entire application is presently in condition for allowance. Should any issues remain, a personal or telephonic interview is respectfully requested to discuss the same in order to expedite the allowance of the application.

Respectfully submitted,

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